

## Lesson 2



Area closed to protect endangered species at Tijuana estuary

# Life on the Border

This lesson is focused on broadening students' understanding of the scope of environmental issues that affect U.S.-Mexico relations and examining the effects of these issues on international politics.

Students work with a partner to read and discuss various scenarios involving a variety of environmental problems found in the U.S.-Mexico border region. Using these scenario cards and a map of the region, students locate where the scenarios take place, explain the specifics of the problems

involved in the scenarios, and brainstorm their possible effects on the relations between the United States and Mexico.

The students examine the real circumstances behind each of the scenarios they studied. They also review historical information on

how environmental issues have influenced the relationship between the United States and Mexico. To conclude the lesson, the students assess their analyses of each scenario in light of the surrounding environmental, social, political, and economic realities.

## Learning Objective

Identify key environmental issues that influence the relations between the United States and Mexico.

Provide examples of environmental impacts that are not contained by the political boundaries between the United States and Mexico.



contamination as waste products (tailings) from the extraction and processing of specific ores are not disposed of properly. Their toxic components have found their way into the water sources that support human communities as well as natural systems.

The rise in population and industry in the border region has also influenced air resources. The flow of people and products between the two countries, together with industrial emissions, continues to detract from air quality.

Local communities, indigenous groups, non-governmental organizations (NGOs), and federal agencies are starting to collaborate to address these issues, yet social, political, and economic differences and international relations make this process difficult.

## Background

The U.S.-Mexico border region is a diverse area with climates ranging from desert to subtropical and economies supported by agriculture, industry, and tourism. The area is comprised of several major watersheds, vital to the people, economies, and natural systems throughout the region.

The border region has seen dramatic economic growth over the past 50 years. Despite the amount of money invested in the cities and industry in the border region, the region remains generally poor. Among the many reasons for this poverty is one on which most people agree: population growth in the area has outstripped the region's ability

to provide necessary quantities of some basic natural resources: water, air, and soil. Population growth has also outpaced the development of infrastructure to prevent degradation of water, soil, and air quality.

Water quality and allocation top the list of environmental concerns in the border region. Agricultural runoff containing pesticides and fertilizers, toxin-laden industrial runoff, and raw sewage end up in the region's groundwater. This contamination influences the quality of freshwater supplies and the overall environmental health of the region. These same byproducts of human industry and communities also affect the soil. Mining in the border region has resulted in soil



Farm workers harvesting

## Key Vocabulary

**Aquifer:** An underground layer of rock or sediment that holds usable amounts of groundwater.

**Emissions:** The release of substances such as gases or particulates that contribute to air pollution. Other forms of emissions include noise, vibrations, light, heat, radiation, and odors.

**Lead:** A heavy, highly toxic, bluish gray metallic element that bends easily and is used in car batteries, pipes, solder, and radiation shields.

**Particulate matter:** Tiny particles of liquid and solids suspended in the atmosphere.

**Salinity:** The total amounts of salts dissolved in water. The average salinity of sea water is 35 parts per thousand.

**Watershed:** The region of land that drains water into a particular watercourse or body of water.

# Toolbox



## Summary of Activities

Students read about environmental problems in the border region; locate on a map the areas where these problems are reported; and analyze how these problems are connected. Students discuss how environmental problems influence the relationship between the United States and Mexico.



## Instructional Support

See Extensions & Unit Resources, page 32

### Prerequisite Knowledge



**Students should be able to:**

- read and locate places on a map.

### Advanced Preparation



**Gather and prepare Activity Masters:**

- Prepare one deck of four **Environmental Scenarios** cards for each pair of students.

**Gather and prepare Materials Needed.**

**Write Prompt on Board:**

- In a central location on the board, write, “How does one of the issues you learned about today influence the relationship between the United States and Mexico?”



## Materials Needed



### Class supplies:

- Pencils or pens

## Visual Aids



No visual aids are required for this lesson.

## Duration



### Preparation Time

20 min.

### Instructional Time

55 min.



## Safety Notes

None

## Activity Masters in the Supporting Materials (SM)

### Border Region Map

SM, Page 16  
One per student

### What Are the Issues?

SM, Pages 17-20  
One per student

### Environmental Scenarios

SM, Pages 21–22  
One per pair of students

### The Reality

SM, Page 23  
One per student



# Procedures

## Vocabulary Development

As appropriate, in each lesson introduce new vocabulary words using the **Key Unit Vocabulary** (Lesson 1 Activity Master).

### Step 1

Direct students to choose a partner to sit next to and work with during the lesson.

Once students are settled, distribute the **Border Region Map** (Lesson 2 Activity Master) and **What Are the Issues?** (Lesson 2 Activity Master) to each student. Give each pair a deck of **Environmental Scenarios** (Lesson 2 Activity Master).

Tell students that, during this class period, they will be reading scenarios involving environmental problems in four parts of the border region. The deck of **Environmental Scenarios** describes specific problems that have been reported in locations in both Mexico and the United States. Direct students to read each **Environmental Scenarios** card with their partner, locate the area referred to in the scenario on the **Border Region Map**, and analyze why that specific environmental problem exists. Students should record their thoughts on their individual copies of the **What Are the Issues?** handout.

### Step 2

When students have completed their work analyzing the **Environmental Scenarios**, ask:

- How might these environmental problems influence the relationship between the United States and Mexico?  
*(Populations on both sides of the border influence and are influenced by these environmental issues; thus, in order to find effective solutions, both countries need to work together.)*
- How might these environmental problems influence the economy? *(In a region that is already relatively poor, the quality of the water, air, and soil has a major influence on the economy. If the soil is contaminated with lead and arsenic, farming will not be as productive. If clean water is not available in the colonias, then they must spend money trucking in clean water. If water's availability is limited along the Colorado River, then agricultural production will decrease.)*
- How might these environmental problems influence politics? *(Many of these environmental issues require local, state, and federal governments to work together to manage natural resources. Since many of these resources are scarce, their distribution and management can cause conflict, thereby influencing politics.)*

### Step 3

Distribute **The Reality** (Lesson 2 Activity Master) to each student. Explain that this handout describes the influence that these environmental issues are having on the relations between the United States and Mexico. Read through each case study as a class.

### Step 4

Collect students' copies of **The Reality**, **Border Region Map**, and the **Environmental Scenario** cards.

Collect the completed **What Are the Issues?** handouts for use in assessment.



## Lesson Assessment

### Description

This lesson helps students identify a variety of environmental problems found in the border region and the various ways these issues influence social, political, and economic factors. Students identify the environment problems and related issues for four environmental scenarios. They record their analysis on **What Are the Issues?** (Lesson 2 Activity Master), demonstrating their understanding of key environmental issues that influence the relations between the United States and Mexico. They conclude the lesson by reading about the influence of each problem on U.S.-Mexico relations.

### Suggested Scoring

Use the Answer Key and Sample Answers on pages 54-57 to assess students' work.

Each question is worth two points for a total of 40 points.

## Answer Key and Sample Answers

### What Are the Issues?

Lesson 2 Activity Master | page 1 of 4

Name: \_\_\_\_\_

**Instructions:** For each scenario card, locate the area discussed on your **Border Region Map**. Discuss the scenario with your partner. Then answer the following questions. (2 points each item)

#### Big Bend National Park

1. Describe the location, climate, and physical geography of Big Bend National Park.

*It is located in southwest Texas and borders the Rio Grande River and the Mexican states of Chihuahua and Coahuila. The climate is relatively dry, mild with winters and high summer and temperatures. The Chisos Mountains run through the park.*

2. What is the environmental problem?

*The particulates in the air have created a haze over the national park.*

3. What are the causes of the environmental problem?

*Coal-burning power plants and urbanization are the causes of this haze.*

4. Who or what does the environmental problem affect?

*The particulates in the air are causing breathing problems to those who live in the area.*

*They also influence the grasslands.*

5. What is the issue in Big Bend National Park?

*Air quality*

#### Ciudad Juarez/El Paso Border Crossing

1. Describe the location, climate, and physical geography of Ciudad Juarez and El Paso.

*El Paso, Texas, and Ciudad Juarez, Chihuahua, are in a desert region of western Texas and northern Mexico.*

## Answer Key and Sample Answers

## What Are the Issues?

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Name: \_\_\_\_\_

2. What is the environmental problem?

*The air quality in these cities is decreasing.*

3. What are the causes of the environmental problem?

*Trucks crossing the border from Mexico to the United States idle for long periods of time, causing an increase in carbon monoxide emissions.*

4. Who or what (human and natural systems) does the environmental problem affect?

*As this is an urban area, carbon monoxide influences the people. Breathing illnesses have increased, especially in little children who live in Ciudad Juarez and El Paso.*

5. What is the issue with the Ciudad Juarez/El Paso Border Crossing?

*Air quality*

**Asarco Smelter (copper and lead mine) near El Paso**

1. Describe the location, climate, and physical geography of the location of the mine.

*The lead and copper mine is located in El Paso, Texas. It is a desert area.*

2. What are the environmental problems?

*El Paso has the highest concentration of lead in the air of all the cities in Texas, and the soil contains high levels of lead and arsenic.*



## Answer Key and Sample Answers

### What Are the Issues?

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Name: \_\_\_\_\_

3. What are the causes of the environmental problems?

*By-products from the mining methods emitted into the air and soil are the cause of the problems.*

4. Who or what do the environmental problems affect?

*The by-products influence the air and soil quality; they may also influence the water quality.*

5. What is the issue with the Asarco Smelter?

*Mining methods*

### Colorado River Basin

1. Describe the location, climate, and physical geography of the Colorado River Basin.

*The Colorado River begins in Colorado and flows southwest through Utah, Arizona, Nevada, and along the border between Arizona and California. The river travels through Mexico and ends in the Gulf of California. The region is arid/semiarid and includes desert and canyon lands.*

2. What are the environmental problems?

*The water is over-allocated, and the quality of the water is decreasing as pesticides and salt concentrations increase.*

3. What are the causes of the environmental problems?

*Overuse of the water due to population growth has resulted in over-allocation; pesticide use is influencing the water quality and quantity.*

## Answer Key and Sample Answers

## What Are the Issues?

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Name: \_\_\_\_\_

4. Who or what do the environmental problems affect?

*The environmental problems affect the people who live along the river, the ecosystems of the Gulf of California, and agriculture.*

5. What is the issue in the Colorado River Basin?

*Water quality and quantity*

## Environmental Scenarios

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**Big Bend National Park** is located in southwest Texas. It encompasses more than 800,000 acres of diverse landscapes including vast deserts and rugged mountains. A tourist to this area in the 1970s could see for hundreds of miles. Today, however, changes in air quality and a significant increase in particulates make a clear view of the area a rarity. In fact, the National Park Service believes that Big Bend National Park has the dirtiest air of all parks in the west. Studies show that the pollution

sources are mostly coal-burning power plants in Texas, Mexico, and the eastern United States. Urban areas in Texas are another source. The particulates from these power plants contribute to the haze in the national park and influence the natural and human systems present. The air quality is associated with respiratory illnesses in humans. The acid compounds in the air are starting to influence the grasslands as well.

## Ciudad Juarez/El Paso Border Crossing

is one of the busiest checkpoints connecting the United States and Mexico. Vehicle traffic is steadily increasing due to population growth and a fast growing economy. In 2001, more than one million trucks crossed the border between Ciudad Juárez and El Paso, Texas. Air quality is decreasing. In August 2003, the Texas Commission on Environmental Quality found that vehicles idling on the international bridges produced about 22% of area-source carbon monoxide emissions in the El Paso-

Ciudad Juárez or local emissions contribute to the public health and safety of the region. The state

## Environmental Scenarios

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### Asarco Smelter (copper and lead mine)

near El Paso is owned by the American Smelting and Refinery Company (Asarco). Asarco is a Mexican mining company with headquarters in the United States. By the 1920s, Asarco had the largest mining operation in Mexico. It had several plants located along the border, including a large copper and lead mine in El Paso, Texas. In 1969, El Paso had the highest concentration of lead in the air of any city in Texas. The plant employed more than 1,000 people in the 1990s. It produced

almost 1 million tons of raw materials each year. Due to low copper prices, the plant closed in 1999. In this same decade, the water and soil in the El Paso area were found to have high levels of arsenic and lead. The U.S. Environmental Protection Agency determined that decades of emissions from the mine produced the contaminated soils. Citizens of El Paso, Texas, and Ciudad Juárez, Chihuahua, fear that the mining waste will eventually end up in the Hueco Bolson Aquifer, their primary source for drinking water.

**The Colorado River Basin** begins in the Rocky Mountains in Colorado. It drains southwest, ending in the Gulf of California. The Colorado River is one of the most litigated and legislated rivers in the world. It supplies water to the highly populated and arid southwest. Signed in 1922, the Colorado River Compact allocated 7.5 million acre feet to the Upper Basin states (Colorado, Wyoming, New Mexico, and Utah). The compact called for the same allocation to the Lower Basin states (Arizona, Nevada, and California). A treaty signed with Mexico in 1945 stated that Mexico should also receive 1.5 million acre feet. A total of 16.5

million acre feet are allocated. Yet studies show that, on average, the Colorado River delivers only 13.5 million acre feet annually. The quantity of water is not the only problem. As the water continues south, it becomes more and more contaminated with pesticides and salt from farms in the United States. By the time the water left in the river reaches Mexican cities and the Gulf of Mexico, the salinity and pesticide levels are so high, the water damages the ecosystems in the Gulf. That water is not safe to use in agriculture. The poor water quality has affected the health of the people and the economy in the region.

**The Reality**

## Lesson 2 Activity Master

**Big Bend National Park**

Because air quality was diminishing on both sides of the border, the United States and Mexico formed a Binational Air Work Group in 1990. This group's purpose is to discuss the air quality issue. They began by trying to investigate where the pollution originated. But the two countries never came to an agreement over the source. Eventually, Mexico pulled out of the group and did not participate in further research.

**Ciudad Juarez/El Paso Border Crossing**

Both sides of the border are cooperating to address the issue of air quality in the region. Local communities, with the support of national agencies, are working to promote alternative fuels, like biodiesel. They are also making more fuel-efficient trucks available to Mexican drivers. The national governments are working to reduce idling from trucks on the international bridges. They are managing traffic better and making border crossings more efficient. El Paso and Ciudad Juarez are also using EPA grants to train mechanics to properly repair vehicle exhaust systems.

**Asarco Smelting (copper and lead mine) near El Paso**

In 1999, Asarco suspended operations in El Paso. The closing of the smelting plant was due to falling copper prices and because Asarco's air quality permit was not renewed. (The company applied to renew its state air quality permit with the states of Texas and New Mexico. Both states denied the company a permit.) Some cross border cooperation has occurred. The Mexican Senate's Border Affairs Commission hosted a binational forum on Asarco in 2005. At the forum, local lawmakers, non-governmental organizations, and federal agencies met to discuss Asarco. The group focused on air and soil quality issues, the mining operations, and safe cleanup of the by-products.

**The Colorado River Basin**

In 2005, seven states and the U.S. federal government began to renegotiate the water allocations for the states along the Colorado River. Various U.S. agencies have partnered with Colorado Basin communities to implement wetland restoration projects. Such projects help preserve natural systems along the river and improve the river's water quality. U.S. and Mexican authorities agree the two countries need to cooperate to improve water quality. They also need to increase water availability for people on both sides of the border. The two nations have begun discussing water needs and ways to protect the limited water source on both sides of the border.

**Border Region Map**  
Lesson 2 Activity Master





